THE NORMAL School Quarterly

Series I JANUARY, 1903 *Number 4*

Agriculture and Horticulture in the Rural Schools

By

DAVID FELMLEY

PUBLISHED BY THE ILLINOIS STATE NORMAL UNIVERSITY, NORMAL, ILLINOIS

NORMAL SCHOOL QUARTERLY

Published by the Illinois State Normal University, Normal, Illinois

Series 1 *JANUARY 1903* *Number 4*

Agriculture and Horticulture in the Rural Schools.

No recent development in the life of the middle West is of greater promise than the growing interest in scientific agriculture. This interest is no new thing. We had such a movement in Illinois fifty years ago. The brilliant discoveries of Sir William Lawes at Rothamstead and of Liebig at Giessen had opened the eyes of the world to the possibilities of agricultural chemistry. Our wisest men believed it was destined to revolutionize methods of farming. The act establishing the Illinois State Normal University in 1857 especially provides that teachers shall be instructed in agricultural chemistry, and animal and vegetable physiology. Largely thru the leadership of Jonathan Turner, of Jacksonville, Congress was induced to pass the Morrill act of 1862 endowing our agricultural colleges. After the war the rapid development of our railway systems brought into cultivation vast areas beyond the Mississippi. The competition of their cheap grain and cattle made farming unprofitable in the older states. But we have now practically reached the limit of the agricultural area. Only by great irrigation works or by expensive drainage systems can any considerable addition be made to our arable lands. Farming now must become intensive rather than extensive; hence the present revival of interest in scientific agriculture is in response

to a genuine economic demand. The attendance upon our agricultural colleges is rapidly increasing. Their bulletins are eagerly read by intelligent farmers. Their professors address vast audiences at the farmers' institutes. Our legislatures appropriate large sums for their support.

In this advance agriculture is moving in the same lines as all other trades and professions. The apprentice system is dying. Modern civilization is not satisfied with rule-of-thumb methods learned by imitation. It demands that all arts be rational arts intelligently based upon an underlying science, and has created the technical school to meet this demand. But not every farmer's son can attend the agricultural college. Nearly all must depend upon the literature issued by such institutions. The bulletins are often too technical to appeal to the average farmer; they abound in scientific terms based upon distinctions of which he is ignorant. It is evident that the agricultural experiment station will never accomplish its purpose unless there is diffused among our farming population an elementary knowledge of the sciences relating to agriculture. The rural schools and the high schools attended by farmers' sons must provide the necessary instruction. There seems no other practical way.

The special instruction offered in this line is not merely to train skillful farmers. It is quite important that farmer boys and girls learn to appreciate and love the country. There need be here no division in material or method. The knowledge of soil and atmosphere, of plant and animal life that makes him an intelligent producer puts him in sympathetic touch with these activities of nature. If the farmer as he trudges down the corn rows under the June sun sees only clods, and weeds, and corn, he leads an empty and a barren life. But if he knows of the work of the moisture in air and soil, of the use of air to root and leaf, of the mysterious chemistry of the sunbeam, of the vital forces in the growing plant, of the bacteria in the soil liberating its elements of

fertility; if he sees the relation of all these natural forces to his own work; if he can follow his crop to the market, to foreign lands, to the mill, to the oven and the table; if he knows of the hundreds of commercial products obtained from his corn or the animals that it fattens: he then realizes that he is no mere toiler; he is marshaling the hosts of the universe and upon the skill of his generalship depends the life of nations.

It is not feasible in the school to teach agriculture as an art to any considerable extent. We cannot teach practically how to lay a drain, but we may show why a field should be drained. We may not teach the best method of cultivating corn, but we may show why it should be cultivated, and the general principles that should control such cultivation. We cannot in the rural school determine experimentally the best ration for feeding any class of stock, but we may learn of the value of variety in the food supply of man or beast, of the principal classes of foods, and of the function of each in the animal economy.

The instruction cannot be given merely from books or in talks by the teacher. In this study, as in all others, books are of use after the student has made some progress. Unless there can be practical experiments to arouse the pupil's interest and to give him clear, first-hand ideas of the matter discussed in the books or lectures, they can be of little value. Canada, Ireland, England and France, all have tried teaching agriculture by introducing into the schools specially prepared books dealing with methods of cultivation of the important crops, gardening, and a few notions about the care of live stock, soils, manures, drainage and common agricultural instruments. All have failed. Without teachers who believe in this work, who know what to do and how to do it, nothing can come from the present movement. Hence the efforts of farmers' institutes should be directed not so much towards legislation requiring the subject to be taught, as towards

building up a public sentiment that shall demand qualified teachers.

The education of the farmer does not demand new subjects so much as it demands the teaching of the old branches with reference to the needs of farm life. The school should face the farm rather than the town. A system of farm book-keeping, enabling the farmer to keep an accurate account with every crop and live stock interest on his place, would go far towards stopping leaks, towards introducing economical and business methods. If the problems of arithmetic deal with topics directly or indirectly connected with the activities of the farm they will prove more interesting and efficient from the school standpoint and at the same time will accustom the student to consider the quantitative aspect of the things with which he deals. I give three simple problems for fourteen-year-old children relating to the corn crop.

1. If corn planted in hills 3 feet 8 inches apart produces three ears to the hill averaging 10 ounces in weight, what is the yield in bushels per acre?

2. Twenty-two stalks out of 150 are found without ears. At this rate the loss from barren stocks is what per cent of a full crop?

3. A load of corn in the ear, 10 feet long, 3 feet wide, 30 inches high, weighs 2,310 pounds. Each bushel occupies how many cubic inches?

Geography will be more practical as well as of greater educational value if it emphasizes the study of soil and climate and other physical conditions as determining the agricultural products and leading occupations of the people of various regions. In these days of cheap transportation and world wide competition the farmer must know thoroly the relative advantages of his competitors in various lines of production;—the fertility of their fields, the efficiency of their methods of cultivation and harvesting,

the cost and intelligence of their labor, their nearness to market. The Illinois farmer must stick to the great staples for which nature has favored him. A little more knowledge in this line would have prevented some recent disastrous experiments with a crop for which we are not specially fitted and requiring a great deal of hard labor. Fullness of knowledge of the industrial life of the world fosters on intelligent interest in one's own occupation.

History, whose purpose is to explain existing institutions, loses none of its interest and value by devoting a large share of its space to the development of our agriculture and tributary industries. Almost the entire history of our country can be centered about our wealth of fertile soil, the contest for its possession, the tide of population that has flowed over it, the diverse products of different sections, the systems of labor that have grown up to secure effective cultivation, the struggle for an outlet to foreign markets thru cheaper transportation and the removal of restrictions on trade. All of our great political questions have been fundamentally economic questions vitally related to our dominant industry, agriculture.

The elements of physics including the mechanical principles of machinery, the behavior of water in the soil, weather phenomena, and the laws of heat are of prime importance. Simple experiments and constant appeals to the experience and observations of the pupils are more effective than text-books. Little apparatus need be bought. Much can be made by teacher and pupils. Thus, to illustrate, the effect of soil conditions upon capillary action, three tomato cans with perforated bottoms are filled respectively with loose dry soil, with dry soil pressed in the can, and with a dry cloddy soil that has been worked when too wet. The cans are weighed, set over night in shallow pans containing one-half inch of water, and weighed again the next day.

For this and many other school uses are needed old-fashioned grocers' tea scales with weights varying from half an ounce to four pounds.

If the teacher know the subject, or even if he have read carefully such a book as King's "The Soil," he can interest the older pupils in the formation, composition, physical condition and texture of soils as related to plant life; in soil water, soil air, soil temperature and the various elements of fertility that are of vital importance to plant nutrition; in the need of tillage to regulate soil air, moisture, temperature, as well as to keep down weeds; in the function of drainage, crop-rotation, and artificial fertilizers.

The study of the rearing and feeding and proper care of domestic animals presents so many points of contact with human physiology that the intelligent teacher will carry the two lines parallel. Experiments in feeding with different rations may often be directed by the teacher, where a well-equipped farm provides facilities.

In the fall months no subject is more interesting than the insect life that fills the air with its humming. It is entirely practicable in every school to show the characteristics of the various orders of insects and the different modes of development from egg to adult. Children should become acquainted with the life habits of the pests of the garden, orchard, and field, and with the best methods of preventing their ravages. It is equally important that they recognize the great service of some insects in ministering to the fertilization of plants, and of others in preying upon injurious species.

Along with economic insects must come the birds that hold them in check. With a knowledge of the vicissitudes of bird life will come generous measures to protect them, the enforcement of our laws, the extermination of vagrant cats, the planting of mulberries, wild cherries, and other trees and vines that supply them with food.

The central interest in the study of the farmer must be vegetable life. To it all else is tributary. It is the main source of his wealth; and from it flow the chief delights of those who have learned to find pleasure in the scenes and activities of rural life. In this field the instruction in our elementary schools must accomplish at least three ends:

1. It must stimulate the instinctive love of plant and flower.

2. It must impart a knowledge of the laws and needs of plant growth, both in a state of nature and under the somewhat artificial conditions of farm and garden.

3. It must accustom the child to act upon the promptings that this knowledge will arouse.

In many European school systems the problem has found a solution. The organization of their schools has made it easy. Where teachers are well-prepared for their work and hold their positions for life, where schools are in almost continuous session during the summer months, where the dwelling of the teacher is built by the state only a few rods from the school house, the school garden, which is also the kitchen garden and flower garden of the schoolmaster, provides abundant opportunities for experiment and instruction. With us such a school garden seems an almost hopeless project. The ignorance of our teachers, the annual changes of position in our rural schools, the weeds that run riot in our school yards during the long summer vacations, the vandalism of tramps and thoughtless boys—all seem to veto effectively in this country adoption of the plans that have yielded such admirable results in Europe.

Yet I believe these ends can be accomplished in our rural schools, even under our present organization of the school year, if we can secure teachers who know and love the work. It is idle to expect satisfactory results from the mere use of a text-book or from oral lessons by the teacher. Even in the country the children have made few careful observations. Their notions of na-

tural phenomena are vague and indefinite, largely derived from hearsay and colored by prevailing superstitions. There must be outdoor work, and, to accomplish the ends named above, there must be the personal care of growing plants to which the sense of ownership brings added interest and responsibility. Even if the ultimate end of the study is a better agriculture, it is not best to deal exclusively or even mainly with the cereals or forage crops of the farm. The valuable ends can all be secured in the cultivation of flowers and fruits; they are in themselves of greater interest to the children, and offer a greater variety of features for study. The cultivation of flowers does not present so many problems as the propagation and care of fruit trees; but it yields quick returns and appeals more strongly to the interests of children.

Under American school conditions the success of the teacher must depend very largely upon the extent to which he secures the co-operation of the parents in promoting the home gardens of the children. He can interest the children in the work, show how some of it can be done, and give directions for the rest. He probably will be able to show few finished products of the school garden itself. Even if the school garden could be carried on under as favorable conditions as in Germany, it would still be better to interest the children in the beautifying of their own homes thru their individual efforts.

The purposes of the school garden are especially to develop an interest in flowers, to afford practical instruction in caring for them, to serve as an example and stimulus for the home gardens of the pupils, and to diffuse knowledge of the laws and processes of vegetable growth. There lies in the background the thought of a better agriculture brought to pass thru this agency, and the richer individual life that finds delight in the appreciation of natural beauty.

To secure the best results all features of the garden must contribute to these ends. There must be system and harmony in

the position and arrangement of the garden with reference to the surroundings of the school. It is impossible to lay down many rules of universal application. So much depends upon the available space, the position of the shade trees, the slope of the land. There must be a playground for the children upon which not even a school garden should encroach. We have rejoiced in the recent revival of interest in tree-planting about school premises; yet it is possible to plant too many trees; to plant them too near the building, or to spoil the effect by wrong location. The school premises should resemble a picture, the building near the center surrounded by open spaces bordered by trees and banks of shrubbery, or tall flowering plants. With the exception of the row lining the street in front, most of the trees should be grouped in the remoter portions of the grounds. In irregular masses about the border, care being taken to keep the taller in the rear, may be planted, lilacs and forsythias, syringas, spiraeas, weigelias, and japonicas, flowering almonds, althea, hydrangea, and deutzia, and flowering currants. A few scattering shrubs will not suffice. They should be planted close enough to produce mass effects. A portion of the outskirts of the grounds should be set apart for hardy border plants, perennials that once established will hold their own with little attention. Peonies, bleeding hearts, columbines, phloxes, lilies, irises, and coreopsis, hollyhocks, and rudbeckia will maintain a succession of bloom all summer long about the empty school house. The greater part of the garden must be devoted to annuals and experimental beds. Yet even these should be arranged with reference to general effect as viewed from the front. Strong growers with rank foliage, cannas, sunflowers, castor beans, must stand well to the margin. Tall spikes of flowers upon comparatively naked stems like the amaranth and gladiolus may stand well in the foreground. Generally more pleasing effects are secured by massing each variety, rather than by scattering them among different species.

In beginning a school garden most of the planting must be done in the spring, yet there is much to do in the fall. The plan should be carefully worked out, the sod broken up, and the ground partially prepared for the spring planting. Seeds may be gathered or ordered early from some reliable seedsman. After the garden is once established the gathering and labeling of seeds will receive conspicuous attention.

A few bulbs, crocuses, tulips, hyacinths, should be planted for early spring flowering. The ground should be thoroly pulverized to a good depth. The bulbs may be planted at any time before November 15. September plantings usually yield best results. The teacher should secure a few four-inch pots and instruct the pupils in the mode of preparing hyacinths and narcissi for winter flowering. Unless the school house boasts of a cellar which does not freeze, it will be necessary to take these to the homes of the pupils for development.

In the fall, too, many seeds should be planted—peach pits to be budded in the following September, apple seeds to produce stocks for grafting, and especially nuts and acorns, whether it is desired merely to study their mode of germination, or to grow trees. These trees with long tap-roots do not bear transplanting well. In many parts of the middle west, nut trees are growing scarce. Walnuts, butternuts and shell-bark hickories should be planted abundantly along roadsides, whenever the soil is suitable. As far north as the forty-first parallel in rich soils the pecan is preeminently the tree to plant; it is a vigorous grower, clean-limbed, symmetrical, and beautiful; and at the present prices of the nuts no field or orchard crop can yield a better return for the ground it occupies. If nuts of northern growth are planted, the trees will yield abundantly and the crop will mature.

In the fall months the teacher will start a window garden in pots and window boxes in the south windows of his schoolroom,

not so much as an end in itself, but as a means of instructing the children in the care of their own houseplants. The lessons should deal with such questions as these: the proper admixture of loam and sand or leaf-mold for different species; the use of broken brick or fragments of pottery to insure proper drainage; how often and how freely plants should be watered; the various modes of repotting plants of different ages; the varying amount of sunlight required by different plants; showering or bathing plants to free them from the dust of the schoolroom; how to destroy the red spiders, the green lice, the scales and mealy bug, that infest houseplants; how to propagate petunias, geraniums, salvias, and coleuses by cuttings. The varieties chosen for the schoolroom must depend upon the exposure, the mode of heating the building, and to some extent upon the age of the pupils instructed. In rural schools it will be necessary to carry them all to the homes of the pupils by the end of November. The dust and extremes of temperature that usually prevail in city schools suggest that even for them only vigorous and hardy species be selected. Geraniums, salvias, lantanas, ageratum, and heliotrope grow freely and bloom abundantly with any sort of treatment. A large pot of double white petunias will fill the air with fragrance. These are all readily propagated by cuttings. A Chinese primrose may be bought of the florist. Bulbs of the yellow or pink oxalis may be started at almost any season and will bloom profusely. A basket of asparagus sprengerii should hang before the window. Kenilworth ivy may be substituted at a north window. Begonias and sword ferns may be kept in rooms where direct sunlight never enters.

In March the teacher may place in the south or east windows a few shallow starting boxes for annuals. Asters, calliopsis, cosmos, petunias, phloxes, zinnias, and salvias, will be ready for transplanting to the school garden or to the private gardens of the

pupils early in May. The inexperienced teacher must be prepared for failure in this work. Poor seed, wrong temperature, too much or too little water, earth worms that devour the young seedlings, the "damps" that may cause a flourishing plantation to vanish in a few hours, are only part of the difficulties that vex the soul of the amateur florist.

At this time, when the warming sunshine develops every latent interest in plant life, the pupils should make an experimental study of germination to discover the conditions of light, heat, and moisture most favorable to different plants. Our recent textbooks in botany describe experiments of this character, as well as numerous simple devices for illustrating the effects of drainage, the value of a dust mulch in retaining soil moisture, the importance of soluble nitrates to the growing plant. There is no rural school so unhappily conditioned as to render all of this work impracticable. Nothing else is so potent in awakening an interest in scientific agriculture, for nothing else so clearly reveals man's power to alter and control the vital conditions of plant development.

Early in April, or as soon as the ground is dry enough, spring work in the school garden may begin. The border of shrubs and hardy perennials must be planted before the buds start. Sweet peas are planted, soon to be followed by nasturtiums, and after May 1, by poppies, escholtzia, balsams, marigolds, amaranths, verbenas, portulacca, sweet alyssum, and other annuals. Pupils will bring in from the woods anemones, spring beauties, blue bells, painted cup, trilliums, violets, and spiderwort. When in full flower is not the best time to transplant; yet these may be kept alive with some care, if enough soil is carried with the roots. In rural and village schools it is not best to give much space in the school garden to ordinary fields crops and garden vegetables. A few radishes may be sown to show the effect of topping the leaves upon root development. Peanuts, cotton, okra,

mimosas, and other unfamiliar plants of peculiar habits of growth or high commercial importance may properly find a space.

In many localities public sentiment will soon repress vacation vandalism and see to it that the school garden is not neglected during the summer. Yet even under the most discouraging circumstances it can serve for illustration and "instruction in methods of culture." Children may easily be taught budding, grafting, and other modes of propagating fruit trees. Cuttings from the grape and the currant may be made late in November, buried until spring and set out in May. Seedlings may be grown at home and at school, the root-grafting at least, may be done at school, the grafted stocks set out at home. It is not denied that better trees can be bought of the nurseryman; we claim that unless this interest in horticulture be aroused in early life thru the propagation and care of trees and flowers, it will continue to be true that one-third of the farm homes of Illinois are practically destitute of flowers, three-fourths of them without a reasonable supply of orchard or garden fruits. The condition is not because the household is overworked. It is not because of indifference. It is usually due to simple ignorance of what to do.

Along with this plant study will come a mass of tributary knowledge. The study of soils to determine their behavior toward water, the effect of drainage, the conditions of germination; simple experiments to make clear the necessity of soluble nitrates, potash, and phosporic acid; the insect life of garden and orchard. the birds and bats and toads that prey upon it—all are seen in vital relation to the practical activities in which the child is engaged. It need in no way to diminish the extent of the course in nature study to give it this practical center about which other knowledge is organized. This has been the method of instruction in the education of the race. The bulk of our knowledge of nature has been discovered and preserved only as it served practical ends.

The interest aroused by this study of plants to which personal ownership and care has directed special attention will spread into wider fields. The very difficulty of keeping down weeds will direct attention to the countless thousands of seeds produced by many plants, and the ingenious contrivances by which they enlist wind and water, bird and beast to carry these seeds to new areas. There is no better point at which to attack the general problem of plant life, how to mature and scatter a goodly number of strong seeds, than in studying the life history of some persistent and troublesome weed, and the happy contrivances by which it is enabled to hold its own. We may take for example the common dandelion. We notice first the long tap root enabling it to gather plant food from a lower soil level than the grasses about it, next that this root is fleshy thickened with starch stored up last summer to enable it to make a rapid growth before the grass starts, then the broad leaves spread out flat in the April sun, with bitter juice to discourage any browsing bovine in quest of early vegetation. Later we see the flowers open in the sunshine when the bees are abroad, displaying their bright yellow faces to attract these willing pollen carriers, but closing tight at nightfall and in rain to protect the precious pollen. After the fertilization is complete, the bracts close in until the seeds are ripened; then on some dry windy day the stem makes an astonishing growth of six or eight inches, the bracts fold back, the barbed seeds float away in the wind under their hairy balloons until ready to settle in some inviting spot in our neighbor's lawn. Then with every movement of the air back and forth, their barbs help the seeds work down to the moist soil to germinate and establish themselves. The incentive to such study in none the less vigorous, when the experience of the garden has led us to believe that nature is most generous to her friendless children.

Horticulture can find a place in our schools only as our teachers become interested and qualified. No Normal School

should be without an extensive school garden and greenhouse in the hands of a competent gardener. The unskilled teacher in search of information will derive great benefit from the study of seed catalogs of our leading florists. The writer has always found florists a very pleasant class of men to cultivate. They are invariably men of superior intelligence, so devoted to their profession that they are willing to make no small sacrifice of time and means in the promotion of any enterprise that promises to foster the love of flowers. The best books which the writer has read are Flowers, by Eben Rexford, (published by Penn Publishing Co.), 50 cents; The Nursery Book, L. H. Bailey, (The Macmillan Co.), $1; Garden Making, L. H. Bailey, (The Macmillan Co.), $1.

Announcements

March 16—Spring term of twelve weeks begins.

June 4—Annual commencement.

June 8-July 17—First summer term of six weeks.

July 20-August 27—Second summer term of twelve weeks.

September 7—Fall term of twelve weeks begins.

At the summer terms are taught nearly all the regular twelve-week courses in the various subjects. Students are expected as a rule to take two subjects only and recite twice per day in each. There are also minor courses in many subjects and special courses in method for mature teachers. These special courses include Laboratory Physics, Nature Study, Construction Work, Clay Modeling and Drawing, Public School Music, and Methods in the Common Branches. The primary departments of the model school will be in session during the first term.

The faculty of the first term consists of twenty-four instructors. Twelve will teach the second term.

Address all inquiries for catalogs and information to

DAVID FELMLEY, *President*,

Normal, Illinois.

Application made for admission to the United States mails at Normal, Illinois, as second class matter.